Patent claims

1. High-repetition laser system for generating ultra-short pulses, in particular femto- or picosecond pulses, according to the principle of pulse decoupling, comprising at least
   - an amplifying laser medium (11, 11')
   - a laser resonator with at least one resonator mirror (6a-d, 7a-g, 8a-i, 16, 14, 14') and at least one pulse decoupling component (1, 1') and
   - a pump source (9, 9'), in particular a laser diode source, for pumping the laser medium (11, 11'),

   characterized in that the pulse decoupling component (1, 1') is an electro-optical modulator.

2. High-repetition laser system according to Claim 1, characterized in that the electro-optical modulator is a BBO cell.

3. High-repetition laser system according to Claim 1, characterized in that the electro-optical modulator is an RTP cell, in particular having a component for compensating a thermal drift.

4. High-repetition laser system according to any of the preceding Claims, characterized by at least one dispersive mirror (6a-d, 7a-g, 8a-i) for dispersion compensation, in particular a Gires-Tournois interferometer.

5. High-repetition laser system according to any of the preceding Claims, characterized by at least

one saturable absorber mirror (14, 14').

6. High-repetition laser system according to Claim 5, characterized in that the laser system is formed so that, in the generation of picosecond pulses, the nonlinear phase is less than 100 mrad, in particular less than 10 mrad, the nonlinear phase being calculated per resonator cycle and per 1% modulation depth of the saturable absorber mirror.

7. High-repetition laser system according to any of the preceding Claims, characterized in that the laser system is formed so that, in the generation of femtosecond pulses, the r parameter is less than 1, in particular less than 0.25.

8. High-repetition laser system according to any of the preceding Claims characterized in that the laser medium (11, 11') is ytterbium-doped glass or $Nd:YVO_4$.

9. High-repetition laser system according to any of the preceding Claims, characterized in that the laser medium (11, 11') comprises ytterbium-doped tungstates, in particular Yb:KGW or Yb:KYW.

10. High-repetition laser system according to any of the preceding Claims, characterized in that the laser medium has a disc-like geometry.

11. High-repetition laser system according to any of the preceding Claims, characterized in that the pump source is formed and is arranged in such a way that a pump light spot having a ratio of length to width of at least 2:1 is formed, the pump light spot consisting of a single ray or the

combination of a plurality of rays, the rays preferably being generated by laser diodes.

12. Use of a high-repetition laser system according to any of the preceding Claims for direct material processing by plasma generation.